

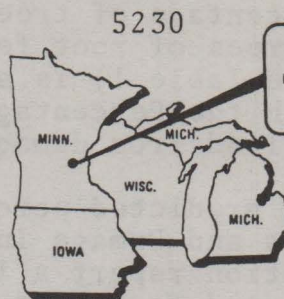
US DEPARTMENT OF AGRICULTURE
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Northeastern Area
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WHITE GRUB POPULATION SURVEY ON
THE HIAWATHA NATIONAL FOREST - 1969

R. F. Fowler

INTRODUCTION

The white grub, Phyllophaga sp., is a serious pest of young pine plantations on the Hiawatha National Forest (Fowler, 1969). The larvae feed on the roots of pine seedlings and cause growth reduction and tree mortality.

The Hiawatha National Forest timber managers requested white grub evaluations in 19 areas proposed for 1970 planting. Because of time limitations, 10 planting sites were examined in July, 1969. Predictions are made of the probable damage that is likely to occur when the areas are planted. The prediction techniques are proposed by Fowler (1969).

SURVEY METHODS

The average grub population for each of the 10 areas was determined from 16 one-cubic-foot-of-soil samples per area. Four samples were taken along each of 4 transects, the soil sifted and the grubs collected.

In the laboratory the Phyllophaga sp. grubs were separated into 4 head-capsule size classes. The remaining grub species were discarded.

PREDICTION METHODS

The calculations for the Indexes are based on methods given by Fowler (1969). The Feeding Index is an indicator used to obtain the Percentage of Trees Damaged and the Damage Index. The Feeding Index is based on the number and size of the Phyllophaga larvae obtained from the sampling.



The Percentage of Trees Damaged refers to the predicted percentage of trees that will be fed upon and includes all degrees of root feeding damage. The Damage Index (see footnote Table 1) is an indicator of the severity of damage. Both the Percentage of Trees Damaged and Damage Index are derived from damage curves related to the Feeding Index.

The predicted percentage of mortality is based on mortality data and Damage Indices from Fowler (1969). For this evaluation report a loss of more than 2/3 of fibrous roots is assumed to result in tree mortality.

RESULTS AND DISCUSSION

The Phyllophaga sp. populations varied considerably among the surveyed areas (Table 1). Estimates are made of the severity of damage (Damage Index) and percentage of trees that will be damaged when the surveyed areas are planted. These estimates are based on the assumption of similar grub populations each year in each area and that the life cycles are not cyclic.

Chloradane is the only insecticide registered by the USDA for white grub control. It is applied as 2.5 lbs. technical Chlordane in 50 gallons of water per acre (2-1/2 qts. of 4 pound emulsifiable concentrate per 50 gallons) or as 25 lbs. granular (10% technical) per acre. Both formulations are broadcast on the soil surface and disked into the top 3-5 inches of soil.

RECOMMENDATIONS

1. The Forest Manager should consider what degree and kind of damage-growth reduction or tree mortality-is acceptable before the area is planted.
2. Treatment with chlordane should be considered for areas where economic damage is expected.
3. Consideration should be made to avoid areas where economic damage is expected (those areas could be set aside as areas suitable for pilot testing or administrative studies).

REFERENCE

- Fowler, R. F. 1969. The white grub in Upper Michigan and northern Wisconsin 1-2 year old red pine plantations. Unpublished Ph.D. dissertation, Michigan State University.

Table 1.--Proposed 1970 planting sites with Phyllophaga sp. populations, Feeding Indexes and predictions of damage and probably mortality in those surveyed.

District	Location			Phyllophaga per cubic ft.	Feeding Index	Predicted		
	T	R	S			% Trees Damaged	Damage ^a Index	% Mortality
Sault Ste. Marie	45	4	8NENE	0.19	16	35	1.7	10
	46	3	18,19	0.00	0	0	1.0	0
	44	4	29	0.00	0	0	1.0	0
	46	3	20	0.25	24	43	2.1	25
	44	4	7	0.06	2	8	1.1	2
	44	4	18	0.56	58	63	2.7	40
	46	5	12	----	---	--	---	--
Munising	45	18	24	0.19	24	43	2.1	25
	46	18	36	0.19	18	38	1.8	18
	46	18	23,24	----	---	--	---	--
	44	18	17,20	----	---	--	---	--
Manistique	42	18	7(E)	0.25	24	43	2.1	25
	42	18	7(W)	1.13	117	70	3.4	60
	42	18	33	----	---	--	---	--
	44	17	7	----	---	--	---	--
Rapid River	41/42	20	2/35	----	---	--	---	--
	41	20	15	----	---	--	---	--
	41	20	9	----	---	--	---	--
	41	20	4	----	---	--	---	--

^aDamage Indexes (root scores) are:

- 1 - no grub feeding
- 2 - 1% to 33% fibrous roots removed
- 3 - 34% to 66% fibrous roots removed
- 4 - 67% to 99% fibrous roots removed
- 5 - 100% fibrous roots removed